Also, the machine may also include a lubricating fluid pump in the crankcase. In some embodiments, the lubricating fluid pump is a mechanical lubricating fluid pump driven by a pump drive assembly, the pump drive assembly being connected to and driven by the crankshaft. In some embodiments, the lubricating fluid pump is an electric lubricating fluid pump. The machine may also include a motor connected to the crankshaft. The machine may also include a generator connected to the crankshaft.

[0011] In accordance with another aspect of the present invention, a Stirling cycle machine is disclosed. The machine includes at least two rocking drive mechanisms. The rocking drive mechanisms each include a rocking beam having a rocker pivot, two cylinders, and two pistons. The pistons each housed within a respective cylinder. The pistons are capable of substantially linearly reciprocating within the respective cylinder. Also, the drive mechanisms include two coupling assemblies having a proximal end and a distal end, the proximal end being connected to the piston and the distal end being connected to the rocking beam by an end pivot. The linear motion of the piston is converted to rotary motion of the rocking beam. The machine also includes a crankcase housing the rocking beam and housing a first portion of the coupling assemblies. Also, a crankshaft coupled to the rocking beam by way of a connecting rod. The rotary motion of the rocking beam is transferred to the crankshaft. The machine also includes a lubricating fluid pump in the crankcase for pumping lubricating fluid to lubricate the crankshaft and the rocking beam and the first portion of the coupling assemblies. Also, a working space housing the cylinders, the pistons and the second portion of the coupling assemblies. A rolling diaphragm for sealing the workspace from the crankcase is also included.

[0012] Some embodiments of this aspect of the present invention include one or more of the following: where the cylinder may further include a closed end and an open end. The open end further includes a linear bearing connected to the cylinder. The linear bearing includes an opening to accommodate the coupling assembly. Also, where the coupling assembly further includes a piston rod and a link rod. The piston rod and link rod are coupled together by a coupling means. The coupling means may be located beneath the linear bearing. Also, where the coupling means is a flexible joint. In some embodiments, also disclosed is where the coupling means is a roller bearing.

[0013] Other embodiments of this aspect of the present invention relate to one or more of a rocking beam drive mechanism for a machine comprising a rocking beam having a rocker pivot, at least one cylinder, at least one piston, the piston housed within a respective cylinder whereby the piston is capable of substantially linearly reciprocating within the respective cylinder, and at least one coupling assembly having a proximal end and a distal end, the proximal end being connected to the piston and the distal end being connected to the rocking beam by an end pivot and linear motion of the piston is converted to rotary motion of the rocking beam.

[0014] A still further embodiment of the invention relate to one or more embodiments of a Stirling cycle machine comprising at least one rocking drive mechanism comprising a rocking beam having a rocker pivot, at least one cylinder, at least one piston, the piston housed within a respective cylinder whereby the piston is capable of substantially linearly reciprocating within the respective cylinder and at least one coupling assembly having a proximal end and a distal end, the proximal end being connected to the piston and the distal end being connected to the rocking beam by an end pivot, whereby linear motion of the piston is converted to rotary motion of the rocking beam, a crankcase housing the rocking beam and housing a first portion of the coupling assembly, a crankshaft coupled to the rocking beam by way of a connecting rod, whereby the rotary motion of the rocking beam is transferred to the crankshaft, a working space housing the at least one cylinder, the at least one piston and a second portion of the coupling assembly, and an airlock space separating the crankcase and the working space for maintaining a pressure differential between the crankcase housing and the working space housing.

[0015] A still further embodiment of the invention relate to one or more embodiments of an external combustion engine comprising at least two rocking drive mechanisms comprising a rocking beam having a rocker pivot, at least two cylinders, at least two pistons, the pistons each housed within a respective cylinder whereby the pistons are capable of substantially linearly reciprocating within the respective cylinder and two coupling assemblies having a proximal end and a distal end, the proximal end being connected to the piston and the distal end being connected to the rocking beam by an end pivot, whereby linear motion of the piston is converted to rotary motion of the rocking beam, a crankcase housing the rocking beam and housing a first portion of the coupling assemblies, a crankshaft coupled to the rocking beam by way of a connecting rod, whereby the rotary motion of the rocking beam is transferred to the crankshaft, a lubricating fluid pump in the crankcase for pumping lubricating fluid to lubricate the crankshaft and the rocking beam and the first portion of the coupling assemblies, a working space housing the cylinders, the pistons and the second portion of the coupling assemblies, an airlock space separating the crankcase and the working space for maintaining a pressure differential between the crankcase housing and the working space housing, a heating element comprising a burner having at least one burner head for igniting and maintaining a heating flame in a combustion chamber adjacent the at least one heater head, and an electronic control unit managing the heating element according to operational data of the engine obtained from at least one of the rocking drive mechanisms, lubricating fluid pump, the crankcase, the working space, crankshaft, heating element and the airlock.

[0016] These aspects of the invention are not meant to be exclusive and other features, aspects, and advantages of the present invention will be readily apparent to those of ordinary skill in the art when read in conjunction with the appended claims and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] These and other features and advantages of the present invention will be better understood by reading the following detailed description, taken together with the drawings wherein:

[0018] FIGS. **1**A-**1**E depict the principle of operation of a prior art Stirling cycle machine;

[0019] FIG. **2** shows a view of a rocking beam drive in accordance with one embodiment;

[0020] FIG. **3** shows a view of a rocking beam drive in accordance with one embodiment;